



On the potential of ground-based GPS measurements for climatological and hydrological applications

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Despite its fundamental role in radiative transfer, atmospheric dynamics, and the hydrological cycle, atmospheric water vapor is still inadequately characterized because of its high spatial and temporal variability and the lack of long-term homogeneous observational data. The availability of long records of high-temporal resolution ground-based GPS measurements of total column water vapor (TCWV) offers a unique opportunity for a variety of atmospheric research studies. The potentials of such measurements that are not yet fully exploited are here presented and discussed. In particular the following issues will be outlined: (i) the characteristics of high-temporal resolution GPS TCWV data (i.e. time behavior, spectral features, long-term memory), (ii) their usefulness for hydrological applications at basin/regional level (i.e. monitoring weather extremes, estimates of water balance components), and (iii) their use in climatological studies (i.e. long-term trends, computation of precipitation efficiency and monitoring dry/wet spells). For these purposes, sample stations in U.S. and South America from the SuomiNet and IGS networks, which have rather continuous measurements for the last decade and a few missing values, have been considered and data analyzed. The main results and comparisons with the reanalysis products are illustrated.